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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/626,440

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David C. Shaver

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9611

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12/17/2004

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EXAMINER

HARRINGTON, ALICIA M

ART UNIT

PAPER NUMBER

2873

DATE MAILED: 12/17/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/626,440

Applicant(s)

SHAVER, DAVID C.

Examiner

Alicia M Harrington

Art Unit

2873

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 July 2003 and 10 May 2004.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-44 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4, 10-12, 14-17, 19-38 and 42-44 is/are rejected.
- 7) ☒ Claim(s) 5-9, 13, 18, 39-41 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 24 July 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 0504.
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

1. The Examiner has considered the information disclosure statement filed on 5/10/04.

Drawings

2. The drawings are objected to because figures 1-6 have hand written text. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

Art Unit: 2873

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1-4, 10-12, 14-17, 19-24, 26-38, 43-44 are rejected under 35 U.S.C. 102(b) as being anticipated by Inoue et al (US 5,673,103).

Regarding claim 1, Inoue discloses an imaging system comprising:

a light source (1; see col. 7, lines 29-37) to generate light for illuminating an object (3; reticle);

having features aligned in a first direction and features aligned in a second direction;

a lens for imaging the illuminated object onto a surface (5; col. 7, lines 47-52);

a spatial selection device selective in a first mode of light corresponding to features of the illuminated object aligned in the first direction and selective in a second mode of light

corresponding to features of the illuminated object aligned in the second direction (7; col. 7, lines 54-67 and col. 8, lines 1-47)

a polarization device optically coupled to the spatial selection device and selective in the first mode of s-polarized light corresponding to the first direction and selective in

the second mode of s-polarized light corresponding to the second direction (1; col. 7, lines 54-40

and col. 9, lines 1-45)- the electric field is perpendicular to the plane of incidence (TE), thus to

one of ordinary skill knows this represents s-polarized light and it is illustrated in figure 5; also col. 9, lines 1-8); and

a controller for selecting operation in the first mode or in the second mode (inherently has a controller since it has modes of operation as defined by (col. 7 and col. 8, lines 1-65).

Art Unit: 2873

Regarding claim 2, Inoue discloses an imaging system as defined in claim 1, wherein the spatial selection device comprises a pupil filter and a rotation device for rotating the pupil filter with respect to an optical axis (for example 7 and 8; col. 9, lines 10-17 and col. 7, lines 54-59).

Regarding claim 3, Inoue discloses an imaging system as defined in claim 2, wherein the rotation device is configured for rotating the pupil filter between first and second positions in the first and second modes, respectively (col. 8, lines 37-40 and col. 9, lines 10-17).

Regarding claim 4, Inoue discloses an imaging system as defined in claim 3, wherein the pupil filter includes one or more blocking regions and one or more non-blocking regions (see figure 5 and col. 7, lines 47-54).

Regarding claim 10, Inoue discloses an imaging system as defined in claim 4, wherein the blocking regions and the non-blocking regions are separated by 90 degrees (see figure 5).

Regarding claim 12, Inoue discloses an imaging system as defined in claim 1, wherein the spatial selection device is positioned proximate a pupil of the lens- It's located in the pupil plane of the projection optical lens #5.

Regarding claim 14, Inoue discloses an imaging system as defined in claim 1, configured as a lithographic system (exposure to a substrate-LSI pattern-see abstract).

Regarding claim 15, Inoue discloses an imaging system as defined in claim 1, wherein the polarization device comprises a polarizer (1) having an optical axis and a rotation device for rotating the polarizer about an optical axis (8; see figure 5; controller rotates the polarizer and slit).

Art Unit: 2873

Regarding claim 16, Inoue discloses an imaging system as defined in claim 15, wherein the rotation device is configured for rotating the polarizer between first and second positions in the first and second modes, respectively (see col. 8, lines 17-49).

Regarding claim 17, Inoue discloses an imaging system as defined in claim 15, wherein the polarizer (1) is located between the light source (see col. 7, lines 33-37) and the object (reticle – 3).

Regarding claim 19, Inoue discloses an imaging system as defined in claim 1, wherein the spatial selection device comprises a pupil filter having one or more blocking regions and one or more non- blocking regions, wherein the polarization device comprises a polarizer, said imaging system further comprising a device for rotation of the pupil filter (7) and the polarizer (1) between respective first and second positions corresponding to the first and second modes, respectively (see col. 8, lines 35-40).

Regarding claim 20, Inoue discloses an imaging system as defined in claim 19, wherein the first and second positions are separated by 90 degrees (see col. 8, lines 35-40).

Regarding claim 21, Inoue discloses an imaging system as defined in claim 1, wherein the spatial selection device (7) and the polarization device (1) are configured for equal intensity illumination of the surface in the first and second modes. - The filter only blocks out p-light component in each mode in each mode.

Regarding claim 22, Inoue discloses a method for projecting an image onto a surface, comprising:

Art Unit: 2873

generating light for illuminating (see col. 7, lines 30-37) an object (3) having features aligned in a first direction and features aligned in a second direction (for example A and B of figure 5),

in a first step, imaging onto the surface light corresponding to features of the illuminated object aligned in the first direction, blocking light corresponding to features of the illuminated object aligned in the second direction, and polarizing light imaged onto the surface to select s-polarized light corresponding to the first direction (see col. 7, lines 40-65 and col. 8, lines 1-65); and

in a second step, imaging onto the surface light corresponding to features of the illuminated object aligned in the second direction, blocking light corresponding to features of the illuminated object aligned in the first direction, and polarizing light imaged onto the surface to select s-polarized light corresponding to the second direction- (the electric field is perpendicular to the plane of incidence (TE), thus to one of ordinary skill knows this represents s polarized light and it is illustrated in figure 5- also col. 9, lines 1-8)).

Regarding claim 23, Inoue discloses a method as defined in claim 22, wherein blocking light is performed by a pupil filter having one or more blocking regions and one or more non-blocking regions (see figure 5-hatched and non-hatched regions).

Regarding claim 24, Inoue discloses a method as defined in claim 23, further comprising rotating the pupil filter from a first position to a second position between the first and second steps (see col. 7, lines 54-67 and col. 8, lines 30-47).

Regarding claim 26, Inoue discloses a method as defined in claim 22, wherein illuminating an object comprises illuminating a lithography mask (3; exposure system for LSI patterns).

Art Unit: 2873

Regarding claim 27, Inoue discloses a method as defined in claim 22, configured for optical lithography (exposure system for LSI).

Regarding claim 28, Inoue discloses a method as defined in claim 22, wherein polarizing light is performed by a polarizer (1).

Regarding claim 29, Inoue discloses a method as defined in claim 28, further comprising rotating the polarizer between first and second positions between the first and second steps (see col. 7, lines 45-60 and col. 8, lines 1-47).

Regarding claim 30, Inoue discloses a method as defined in claim 22, wherein blocking light is performed by a pupil filter (7) having blocking regions and non-blocking regions (see figure 5), wherein polarizing light is performed by a polarizer (1), further comprising rotating the pupil filter and the polarizer between respective first and second positions between the first and second steps (see col. 7, lines 45-60 and col. 8, lines 1-47).

Regarding claim 31, Inoue discloses a method as defined in claim 22, wherein illuminating an object comprises equal intensity illumination of the object in the first and second steps. -The filter only blocks the p-component of the light in each mode.

Regarding claim 32, Inoue discloses an imaging method comprising:

generating light (see col. 7, lines 30-37) for illuminating an object (3) having features aligned in a first direction and features aligned in a second direction (see figure 5);

imaging the illuminated object onto a surface (6; see figure 5),

in a first step, selecting light corresponding to features of the illuminated object aligned in the first direction and selecting s-polarized light corresponding to the first direction (see col. 7, lines 40-65 and col. 8, lines 1-65; and

Art Unit: 2873

in a second step, selecting light corresponding to features of the illuminated object aligned in the second direction and selecting s-polarized light corresponding to the second direction -(the electric field is perpendicular to the plane of incidence (TE), thus to one of ordinary skill knows this represents s polarized light and it is illustrated in figure 5- also col. 9, lines 1-8).

Regarding claim 33, Inoue discloses an imaging method as defined in claim 32, wherein illuminating an object comprises illuminating a lithography mask (3; exposure apparatus for LSI pattern).

Regarding claim 34, Inoue discloses an imaging method as defined in claim 32, wherein selecting light is performed by a pupil filter (7) having blocking regions and non-blocking regions, wherein selecting s- polarized light is performed by a polarizer (1), further comprising rotating the pupil filter and the polarizer between respective first and second positions between the first and second steps (see col.7, lines 45-60 and col. 8, ones 1-47).

Regarding claim 35, Inoue discloses an imaging method as defined in claim 32, wherein illuminating an object (3) comprises equal intensity illumination of the object in the first and second steps. -The filter only blocks one component of the light in each mode.

Regarding claim 36, Inoue discloses an optical lithographic imaging system for projecting onto a surface a mask having features aligned in a first direction and features aligned in a second direction, comprising:

a pupil filter (7) selective in a first position of light corresponding to features of the illuminated mask aligned in the first direction and selective in a second position of light corresponding to features of the illuminated mask aligned in the second direction (see col.8, lines 1-47);

Art Unit: 2873

a polarizer (1) optically coupled to the pupil filter and selective in the first position of s-polarized light corresponding to the first direction and selective in the second position of s-polarized light corresponding to the second direction- (the electric field is perpendicular to the plane of incidence (TE), thus to one of ordinary skill knows this represents s polarized light and it is illustrated in figure 5- also col. 9, lines 1-8); and

a device configured for movement of the pupil filter (7) and the polarizer (1) between the respective first and second positions thereof (8; see col. 7, lines 50-67).

Regarding claim 37, Inoue discloses an imaging method as defined in claim 36, wherein the device is configured for rotating the pupil filter (7) and the polarizer (1) between respective first and second positions (see col. 8, lines 15-45).

Regarding claim 38, Inoue discloses an imaging method as defined in claim 36, wherein the pupil filter includes one or more blocking regions and one or more non-blocking regions (see figure 5; hatched and non hatched regions).

Regarding claim 43, Inoue discloses a method of projecting an image onto a surface, comprising: illuminating an object (3) having features aligned at least in a first direction and in a second direction (see col. 7, lines 30-67 and figure 5)

projecting s-polarized light corresponding to features aligned in the first direction onto the surface, while blocking p-polarized light corresponding to features aligned in the first direction and blocking light corresponding to features aligned in the second direction (see col. 8, lines 1-50)- on TE light is transmitted and one feature at each mode; and projecting s-polarized light corresponding to features aligned in the second direction onto the surface, while blocking p-polarized light corresponding to features aligned in the second

Art Unit: 2873

direction and blocking light corresponding to features aligned in the first direction (see also col. 8, line 59-67 and col. 9, lines 1-10).

Regarding claim 44, Inoue discloses an imaging system for imaging an object (3) onto a surface (6) the object having features aligned at least in a first direction and features aligned in a second direction, comprising:

a lens system (see col. 7, lines 30-50);

a pupil filter (7) located proximate a pupil of the lens system (see col. 9, lines 1-3), the pupil filter having a first position selective of light corresponding to the features aligned in the first direction, and a second position selective of light corresponding to the features aligned in the second direction (see col. 8, lines 1-47); and

a polarizer (1) optically coupled to the pupil filter having a first polarizer position selective of s-polarized light corresponding to the first direction, and a second polarizer position selective of s-polarized light corresponding to the second direction (the filter and polarizer rotate for each mode), the pupil filter coordinated with the polarizer to be in the first polarizer position when the pupil filter is in the first position, and in the second polarizer position when the pupil filter is in the second position.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Art Unit: 2873

6. Claims 11,25,42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Inoue et al (US 5,673,103).

Regarding claim 11, Inoue discloses an imaging system as defined in claim 4, wherein the spatial selection device is configured to block light corresponding to features of the object aligned in the second direction in the first mode and configured to block light corresponding to features of the object aligned in the first direction in the second mode. However, Inoue fails to specifically disclose the spatial selection device (7) is shutter assembly. Although, the spatial filter provides the equivalent function of light blocking and light transmission. Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have a shutter assembly, since Inoue discloses the claimed invention with the exception of a shutter assembly, the system performs equally as well with the spatial filter of Inoue, and thus it lacks criticality in the invention.

Regarding claim 25, Inoue discloses a method as defined in claim 22;however, Inoue fails to specifically disclose the spatial selection device is shutter assembly. Although, the spatial filter provides the equivalent function of light blocking and light transmission. Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have a shutter assembly, since Inoue discloses the claimed invention with the exception of a shutter assembly, the system performs equally as well with the spatial filter of Inoue, and thus it lacks criticality in the invention.

Regarding claim 42, Inoue fails to specifically disclose the polarizer comprises a birefringent half wave plate. However, a birefringent material separates light from a light source into two components that by nature of a half wave plate would be rotated to provide a polarization state

Art Unit: 2873

resulting from the $\frac{1}{2}$ wavelength rotations. Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a birefringent $\frac{1}{2}$ wave plate to provide a polarization state for illumination since that is the function of the polarization in the system and it would be a functional equivalent.

Allowable Subject Matter

7. Claims 5-9,13,18,39-41 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Regarding claims 5 and 39, prior art taken either singularly or in combination fails to anticipate or fairly suggest the limitations of the dependent claims, in such manner that a rejection under 35 U.S.C 102 or 103 would be proper. The prior art fails to teach a combination of all the claimed features as presented in independent claims, which include a blocking region comprise wedge shaped blocking regions as claimed.

Regarding claim 8 and 40, prior art taken either singularly or in combination fails to anticipate or fairly suggest the limitations of the dependent claims, in such manner that a rejection under 35 U.S.C 102 or 103 would be proper. The prior art fails to teach a combination of all the claimed features as presented in independent claims, which include blocking regions bound by an inner radius and outer radius as claimed.

Regarding claim 9 and 41, prior art taken either singularly or in combination fails to anticipate or fairly suggest the limitations of the dependent claims, in such manner that a rejection under 35 U.S.C 102 or 103 would be proper. The prior art fails to teach a combination of all the claimed

Art Unit: 2873

features as presented in independent claims, which include a region proximate the optical axes with partial transmission of light from the light source as claimed.

Regarding claim 18, prior art taken either singularly or in combination fails to anticipate or fairly suggest the limitations of the dependent claims, in such manner that a rejection under 35 U.S.C 102 or 103 would be proper. The prior art fails to teach a combination of all the claimed features as presented in independent claims, which include the polarizer located between the object and the surface as claimed.

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alicia M Harrington whose telephone number is 571 272 2330. The examiner can normally be reached on Monday - Thursday 9:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Georgia Epps can be reached on 571 272 2328. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Alicia M Harrington

Application/Control Number: 10/626,440

Page 14

Art Unit: 2873


AMH

Examiner
Art Unit 2873